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UNIVERSITY OF NEW HAMPSHIRE

EXCELLENCE

Teaching ■ Research ■ Public Service

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057

“**W**hat do I do when I teach? You have to help students understand what makes good logic, fasten onto a problem, and see the world in that problem.”

Robert Mair, associate professor of psychology



In the last few years, low cholesterol diets have been touted as a panacea for high cholesterol problems. Yet in all the research done to date, says Rebecca Warner, associate professor of psychology, the connection between low fat diets and the lowering of blood cholesterol is weak at best. "I teach my students to look for the evidence to see what the data really says. A lot of advertisers make grossly inflated health claims."

Warner. "I want my students to think very carefully before they leap. People do more research on what car to buy than they do on their health care options. I tell them, 'Ask your doctor questions. You're allowed to know the answers.' And look for the data on these procedures."

In her research methods class, students begin to think of their semester project the first week of class. Warner requires that they hand in progressively larger parts of the finished project throughout the semester. This way she can see if they're heading in the right direction, or guide them back if they wander off course.

"By working on one project throughout the semester, my students are given the opportunity to develop. I encourage them to begin with something that genuinely interests them. They find this topic early and it keeps them focused for the rest of the semester. Their project becomes something they are heavily invested in—not a last-minute paper churned out in the final days of the semester."

In her advanced undergraduate and graduate classes, Warner delights in turning the cause-effect teaching style on its head. Rather than providing students with questions and asking for answers, she hands out large databases and asks them to design their own analyses of the data. To simulate real

life research, she also gives them data that has obvious errors in it. Students who don't look for false data will lose points. Again, this teaches them not to take all the data they see at face value.

Warner also applies her keen eye for data analysis to the vagaries that surround high blood pressure. She has been studying the effects normal activities—like talking and listening—have on blood pressure levels.

"For a long time, blood pressure was thought of as a constant," she says. "Yet, we have been finding that variables like presence, touch, and unexpected incidents all influence the rise and fall of blood pressure. During a forty-minute conversation, some of the participants' systolic blood pressure would spike up as much as fifty mm. Others' blood pressure only varied by five mm, up or down, during the entire session."

Why would someone's blood pressure vary so much during a conversation? "Talking," Warner says, "is very arousing. The participants with high-average blood pressure during the test say they found their discussions very warm and enthusiastic. We were surprised by that. Most of current theory holds that high elevation of blood pressure is a pathological response. Yet, our research does not seem to hold up that theory." Instead, Warner and others are thinking that the arousal that goes with the reaction to conversation may actually be therapeutic, like aerobics or a form of mental gymnastics.

Debunking myths is a fascinating pursuit, and Warner's work on blood pressure variations may change how we perceive the benefits and hazards of stress. For now, her teaching style will keep graduates of her classes on their toes whenever snake oil salespeople approach.

by Susan Warner Smith, writer/editor,
University Publications

"Most interesting questions have more than one answer"

Rebecca Warner is a full-fledged believer in the debunking of myths. As a social psychology professor who teaches statistics and research methods, she has ample opportunity to help her students root for the truth among piles of data.

"Much of what we currently know about health care is in a state of change. I teach my students to look for the evidence, to see what the data really says. A lot of advertisers make grossly inflated health claims."

One example Warner likes to cite is the myth of cholesterol.

In the last few years, low cholesterol diets have been touted as a panacea for high cholesterol problems. Yet in all the research done to date, the connection between low fat diets and the lowering of blood cholesterol is weak at best. This doesn't mean Warner advocates a diet heavy in steak and ice cream. Instead she cautions students to be wary when media advice to make radical changes in the way they live doesn't make sense with the available data.

"You don't have to be a surgeon to make an informed decision about whether or not to have an operation," says

Durham is light years from Cleveland

In the summer of 1951, Harry Truman was in the White House, the New York Yankees were working their way toward a third consecutive World Series win and *The Catcher in the Rye* had just hit bookstores.

In the summer of 1951, Joseph Murdoch was twenty-four and driving his '41 Oldsmobile from Cleveland, Ohio, to Dover, New Hampshire, with his wife of a few months, Ann, by his side. He was on his way to visit his father's relatives and introduce Ann to his side of the family.

A recent graduate of Case Institute of Technology with a degree in electrical engineering, Murdoch had worked for a year at the lighting headquarters in General Electric Nela Park, Cleveland, as an application engineer, but had decided he wanted to teach and pursue his master's degree. Mulling over two offers for teaching assistant positions, one from Cornell and the other from the University of Illinois, he drove U.S. Route 20 to Dover.

He didn't know at the time that his trip would mark the beginning of a forty-year career at the University of New Hampshire, an institution that Murdoch had never even seen when his black Olds rolled into Dover.

In forty years at UNH, Murdoch has witnessed what he terms a "pastoral campus" become a high tech teaching-research university with non-stop activity. A student enrollment of 3,200 in 1952 has ballooned to more than 10,000.

Today, Murdoch can look back on a career that has included four decades in the classroom. With all that experience, it's no surprise that he has come to a few conclusions about education.

"I think a teacher is a coach," he says with a nod. "A teacher doesn't teach as much as help people learn."

Murdoch avoids the straight lecture approach, instead presenting the material and then

prompting a question-answer session. Hands-on lab and problem-solving sessions also insure that Murdoch's classes provide some give-and-take. "Teaching has got to be interactive," he explains. "And students must realize that they have to work at learning. Learning is not that fun."

It may not be fun, but in Murdoch's classes, it is interesting. Still maintaining a busy lighting and illumination research program—he's the author of textbooks on lighting and network theory—Murdoch helped establish the only lighting research and education program in the United States centered in an electrical engineering department.

"I tell my lighting students that if they don't automatically look up at the ceiling when entering a room, I've failed. To learn about lighting, you must observe lighting."

He also tries to learn all the students' names, "and they appreciate that," he says. "I think you need to show the students you care." The students reciprocate—Murdoch recently was chosen by electrical engineering seniors as the recipient of the Tau Beta Pi National Engineering Honor Society Outstanding Teacher Award for 1991-92.

Murdoch tries to match his involvement with students with involvement in campus issues. He was electrical engineering department chair from 1967 to 1976, has been active on various UNH committees and groups, and served as Academic Senate chair in 1989-90. He also is the recipient of various professional honors. The latest is his election as president of the Illumination Engineering Society, a thousand-member North American association of lighting professionals.

"I suppose there are two sides to me," says Murdoch.

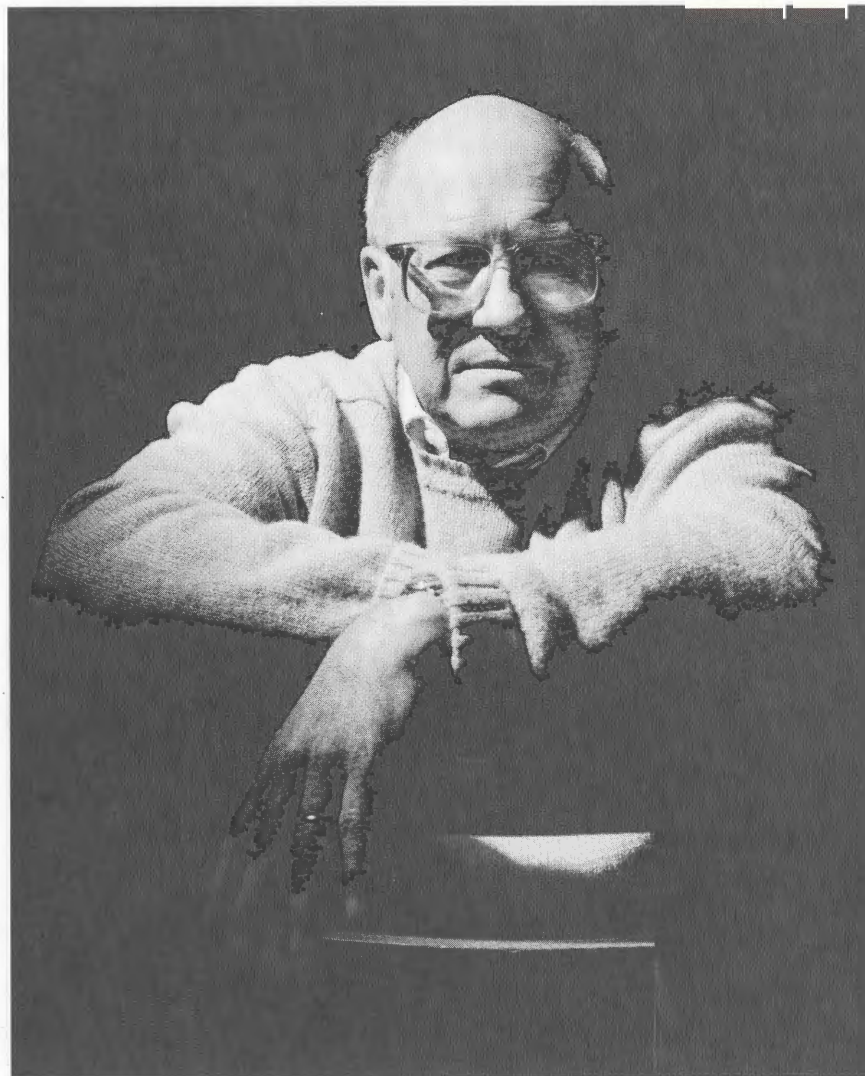
"One likes to just sit here and write a book. The other has an insatiable curiosity about the institution I'm involved in."

During his visit to Dover in the summer of 1951, Murdoch spent an afternoon sanding down a boat hull with his cousin's husband, Merle Wiggin. Merle was taking a course at UNH, and had to pay a bill at Thompson Hall. He asked Murdoch to come along for the ride. Murdoch's father was a 1915 graduate of the New Hampshire College of Agriculture and the Mechanic Arts, later known as UNH, but Murdoch had never seen the campus. And, so, wearing jeans, sneakers, and T-shirt, Murdoch decided to hop in with Merle.

While Merle was paying the bill, Murdoch strolled over to the engineering department in Kingsbury Hall. "The way I'm dressed, I look like I just jumped a merchant ship," Murdoch thought as he pulled the front door open. The electrical engineering department was immediately to the left.

Murdoch smiled, greeted the secretary and then, not knowing what else to say, asked if there were any teaching positions open.

by Carmelle Druchniak, editor,
Campus Journal



Says Joseph Murdoch, professor of electrical engineering, "I tell my lighting students that if they don't automatically look up at the ceiling when entering a room, I've failed. To learn about lighting, you must observe lighting."

Answering a familiar refrain: "When will I use this in real life?"

Who can forget math class? Standing at the blackboard, staring at a long-division problem . . . Hoping that if you stare long and hard enough, an answer will materialize . . . Realizing in horror that all of the classmates standing at the board with you have returned to their seats with smug little smiles on their smug little faces.

Ugh.

Lewis Knight knows that most of us remember all-too-vividly the horrors of math class. A math instructor at UNH-Manchester, Knight tries to free his students from their grammar school phobias.

"My goal has always been to double the number of people who feel 'math-capable' in each class," he says.

It is, he admits, an uphill struggle. "Most people understand the *concepts* of math. It's the *symbols* they have a hard time with," he explains. "Most kids will understand what three-quarters of a pizza is, but then ask them to add and subtract fractions and . . ." Knight rolls his eyes.

Some of Knight's students are traditional college-age, but most are adults returning to

school. These older students, he says, have long memories when it comes to math.

He has been at UNH-Manchester for three years, teaching courses in calculus and remedial math. During the summer session, he also instructs high school math teachers in special workshops.

Knight finds that math teachers may themselves be the product of past math classes. They also may face from their students—and their colleagues—the familiar "when-will-I-use-this-in-real-life" refrain. He admits that most math problems—like the brain-teaser about two trains traveling cross-country at different speeds—will not confront the average citizen, unless he or she is a train engineer.

"But you use the math thinking," he points out, "especially calculus. You use a lot of critical thinking in calculus." This exposure to critical thinking is lost if people avoid calculus because of its formidable reputation, he says, adding that, ironically, "most people who don't like math *can* do calculus."

Knight works closely with his students to dispel their fears. "If I can have one major

contact with a student, something will happen," he says. "I try to see them one-on-one. I get to know them, then the class just changes."

He also tries to get students to help each other. At least thirty minutes of a two-hour class is spent with the group broken into smaller groups, working on problems. "The learning that goes on then is phenomenal," he says. "The learning becomes interactive."

Knight also has experimented with having some students keep a portfolio. "I have them write in it before and after exams," he explains. "I ask them, 'Can you remember the first time you felt unsuccessful at math?' and 'How do you feel coming into this class?'"

He smiles. "I've had three people write themselves out of their math anxiety."

If Knight has a teaching philosophy, it's represented by what he calls "the three R's—renewal, reconstruction, and relationships."

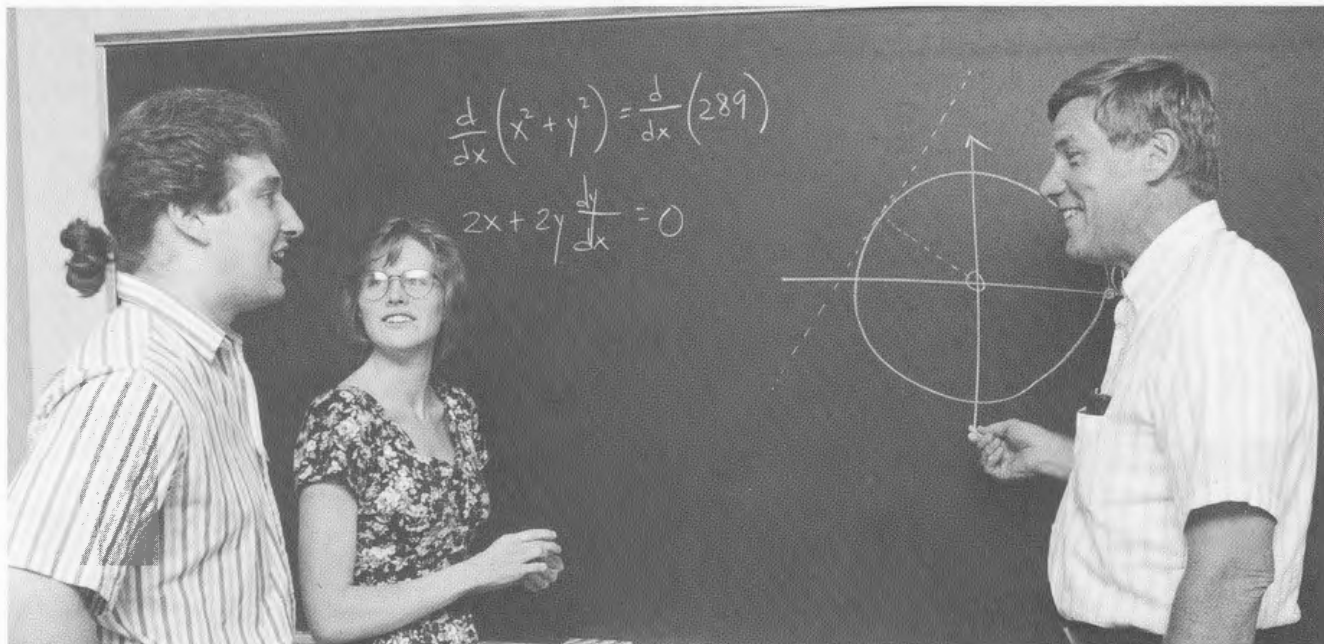
He explains: "Renewal means always looking for a new way of approaching math, a new way to experiment. Reconstruction is showing students how to reconstruct or think out

a problem, rather than memorizing answers. Relationships allow teachers to let students know they care that the students learn."

As if to prove the point a student appears in Knight's office. Knight later explains this particular student had flunked Calculus I, but had repeated the course and received an acceptable grade. Handing the instructor his Calculus II exam worksheet, the student pauses when asked by Knight how he did on the exam.

He shrugs. "It's only problem solving," he tells Knight with a small smile. "I know I can do it."

by Carmelle Druchniak, editor,
Campus Journal



One strategy Lewis Knight, associate professor of applied mathematics, employs to overcome students' fear of math is breaking his class into smaller, problem-solving groups. "The learning that goes on then is phenomenal. The learning becomes interactive. My goal," he says, "has always been to double the number of people who feel 'math-capable' in each class."

Maria Pantelia

Teaching Excellence Award



Maria Pantelia, assistant professor of Spanish and classics, is one of a handful of American academics participating in the Perseus Project, a new way of teaching the classics through the use of interactive computers that gives students and researchers a chance to cross disciplines and juxtapose previously disparate pieces of knowledge.

A startling new link with the gods

The scale of the task itself—teaching a class of three hundred students about classical mythology—would seem to require a person energized by the power of the gods. But Maria Pantelia is herself of Greek origin so perhaps the legendary wisdom and good counsel of Athena just come naturally. In any case, her students in Classical Mythology 501 are ready to offer teaching evaluations that sound like ancient hymns of praise—"gentle, receptive, refreshing, enthusiastic, understanding"—and of course no such story, today or millenia ago, would be complete without "awesome."

Imagine standing in front of three hundred students three times a week and asking them

to set aside their thoughts of MTV, Madonna, and mountain bikes to listen to stories that are 2,500 years old about gods and goddesses. Where would you begin? Pantelia's success begins with her own education. First came her Ph.D. program—"Most of what I do I owe to Ohio State; they really stressed teaching."

Then, two years ago, came an opportunity to be a fellow of the Dana-Dartmouth Collaborative at Dartmouth College. There, she was taught by John Rassias, a figure of mythic, and controversial, proportions in the world of language teaching. "This was another important step. I have never been the same since." Rassias's message was clear—learning foreign lan-

guages should be fun. "I agree," says Pantelia, "and think students should not be bored. Sometimes I start the semester by giving each student an M&M candy. I say that the letters stand for Master of Mythology and that if they eat the candy they will do well in the course. Once I have their attention, we begin to talk about what is important. We read the myths and we read modern plays—Euripides and *Desire Under the Elms*, for instance—and we can see how the myths apply to all societies. Students love the stories."

Although her training has given Pantelia the tools for working effectively in a large classroom, there is something deeper at work here, too. "I am Greek. I care about the subject—it's part of my tradition. It is most rewarding when a student says, 'This course has changed the way I look at things. Now I can see how myths are part of our lives.' This is very important to me."

But nothing—neither a glimpse of the ancient past nor Pantelia's engaging teaching style in the present—can prepare one for the startling vision of the future that sits quietly in the corner of her office in the form of a Macintosh computer. With it, Pantelia has so much wisdom and power at her fingertips that Zeus himself would trade a few thunderbolts for a session at the keyboard. With it, a student can explore the classical world in all its forms by just the touch of a finger.

Push a button and an aerial photograph of Greece appears on the computer screen. Another button takes you closer, to a map

of a region, then a map of a city, then a neighborhood, finally the floor plan of a temple or theater. What did people see in that theater? Another flick of the finger calls up the text of a play, Greek and English versions side by side. Did you forget a Greek vocabulary word? Highlight it and the meaning appears in the screen. But what did the characters in the play look like? Suddenly a full-color photograph of a vase painting appears.

Traditionally, these materials have appeared in separate books, separate parts of the library, even separate departments. Now a student can move across the disciplines, making her or his own connections, finding in a modest, but crucial, way the interrelationships that have fascinated professional scholars. Material relevant to a student's project can be printed out to form a customized sheaf of background information.

Right now the computer that does all this is in Pantelia's office, but the power of this process to induce learning in today's computer-reared generation of students is so powerful that she is confident more computers capable of running the software will appear at UNH in the next few years.

"In the future, we may use computers instead of a book. And the disks will not only have the subject matter, they will also have the syllabus, lecture outlines, and even the exams. Teachers will be able to customize the disks to fit their particular classes."

by Drew Sanborn, writer/editor,
University Publications

"Two wrongs don't make a right"

Recently on sabbatical to write his next book on the use of physical punishment to discipline children, Murray Straus took his boat on a five-month trip to Key West, stopping along the way to write. The peaceful waters and refreshing environment were a perfect counterpoint to his usual research, which has led him through a maze of nightmarish violence between people who are supposed to care the most about each other.

From wife beating to child abuse, from incest to rape, Straus has witnessed it all over the past forty years he's spent researching the family, documenting his findings in more than 200 articles and a dozen books. He admits he rarely stops being surprised by the pain he sees family members inflict on one another.

"The fact that families can be so violent is shocking," says Straus, adding that he would have a difficult time working in a clinical setting, where he would have to witness this violence on a daily basis. "I knew that it existed, but I didn't realize, when I began my research, that there are norms for justifying and tolerating it."

Straus, co-director of the Family Research Laboratory and a professor of sociology, became involved in family violence research in 1970. He was serving on the program committee for that year's annual meeting of the National Council on Family Relations. "A number of us didn't want to meet in Chicago because of police brutality at the 1968 National Democratic Convention," explains Straus. "But we had a contract with the hotel."

When a colleague suggested "Violence and the Family," Straus saw a way to resolve both the theme of the conference and justify Chicago as its site.

"It was a very violent time," he recalls, "with the assassina-

tions of Martin Luther King and Robert Kennedy, the rising murder rate, and the nation at odds over the Vietnam War. By making violence and its effect on the family the themes of our annual meeting, it was a chance to act on our opposition to violence.

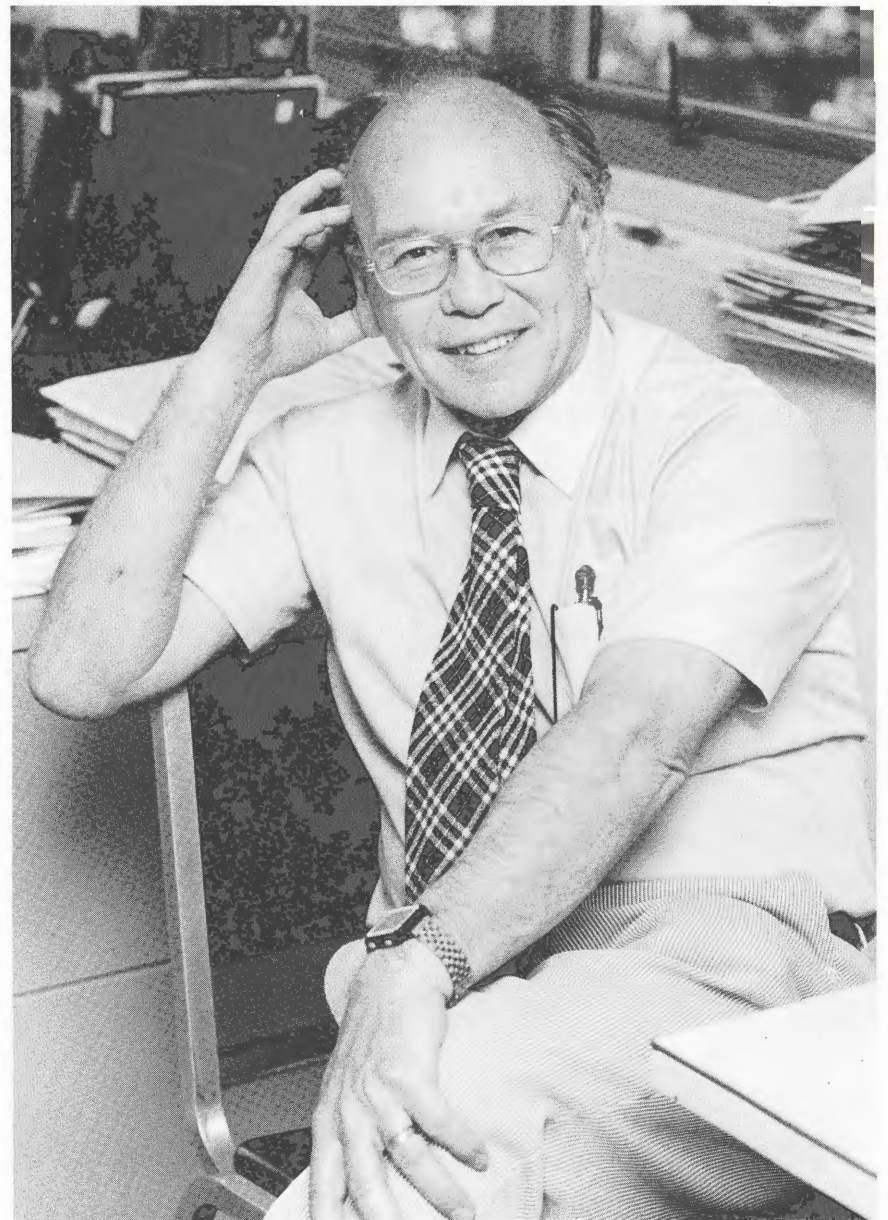
"My initial paper on the subject was more or less non-controversial," he says. "It was about differences between occupational groups in the use of physical punishment."

Straus was shocked by what he found. In polling first year college students for that initial paper, he learned that fifty percent said they had been threatened with or had been victims of physical punishment the previous year.

"Until that point, I thought physical punishment was used only on young children of whom more than ninety percent are spanked," says Straus. "I learned that almost half of all teenagers have to leave home to be free of the risk of being hit by a parent."

Drawing the line between physical punishment and physical abuse is not as easy as some people like to think. Straus believes that even spanking a child can have long-term damaging effects. "Punishment has been the approach that's been taken in controlling crime in this country, but that has proven a bankrupt policy," he says, citing the high United States' imprisonment rate—the highest in the Western world. "It's time to rethink the methods we use to curtail crime, looking instead to the fundamental causes of it. When it comes to violent crime, one cause is the use of physical punishment by parents. Spanking kids may stop misbehavior, but it also teaches the use of violence."

Straus details a typical situation. Johnny gets into trouble at school for hitting another child, who broke his favorite



Murray Straus, professor of sociology, sees a connection between violent crime and parents' use of physical punishment. Johnny gets into trouble at school for hitting another child, who broke his favorite toy. The parents spank Johnny for fighting, telling him that this is unacceptable behavior. "The parents are saying it's unacceptable to hit, but then they hit the child. The message is that some hitting is okay."

toy. The parents spank Johnny for fighting, telling him that this is unacceptable behavior.

"The parents are saying it's unacceptable to hit, but then they hit the child. The message is that some hitting is okay," explains Straus.

Straus's current research aims to prove that physical punishment within families may cause children to become more violent adults. "Spanking provides a model for how to correct wrongdoing—most murders are attempts to correct wrongdoing. Most husbands beat their wives because they feel they're correcting wrong behavior. Two wrongs don't make a right, especially if that second wrong is violence."

by Sharon Keeler, writer/editor,
University News Bureau

"We teach what we need to learn"

Kate Hanson was watching TV with some friends when a clip from the "Donna Reed Show" came on. "Donna Reed is standing in her kitchen, naturally, and she says, 'Why can't everyone just try to be nicer to each other?'"

"Everyone laughed," smiles Hanson, "but I think that's what we need to do."

"Not that it's easy. This 'trying to be nicer' involves challenging all the interpersonal, social, and political barriers that make our relationships so difficult."

Hanson's classes in human relations and social issues are working experiments in the application of this ideal. "I see each class as a microcosm of the larger society," she explains. "We deal with differences, conflicts, a variety of values and beliefs—the on-going challenge is to apply the 'book' theories to the experiences we're sharing in the classroom. If we can't mirror what we're learning about human behavior and social development in our work together, then the theories lose their relevance."

Her emphasis is on process, on the means by which learning is accomplished. She quotes a phrase that's stayed with her from an introductory drawing class taken many years ago: "'Form is the shape of content.' How the class is structured, how students are encouraged to act, and the way material is presented all have a powerful impact on what students really learn," she says. "Which is why I always try to teach in a circle, and why I insist, often to much moaning from my students, that it be a true circle—not a square, or an oval, or a Q."

"In the classes I teach, rows would mean that I have the answers and that the real conversations happen between me and the student speaking at the time. I want the people in the class to realize that we're all teachers and all learners. I also want each student to realize that she or he is as important as anyone else in the room and as necessary to making the class really work."

As an undergraduate at Connecticut College, Hanson studied English literature; she

planned to enroll in the UNH master's program in English. "But I realized that, although I love literature, my approach to it isn't scholarly. It's said in workshop lingo, 'We teach what we need to learn.' And I realized I needed to learn more about relationships. I'm fascinated with the complexities and possibilities of our interactions with each other."

So she came to UNH to earn her M.Ed. through the counseling program, and worked with the Special Services Program, now part of the TAsK (Training in Academic Skills) Center, conducting occasional workshops. She began teaching human behavior as part of the management programs of the Division of Continuing Education and the School for Lifelong Learning, and consulted with businesses on human relations.

"This background," she explains, "gave me an applied approach to teaching: What difference does this lesson make in our lives as we live them now?"

She's developed this applied approach through a commitment to women's issues, teach-

ing in the women's studies program, and serving on the UNH President's Commission on the Status of Women, which last year cited her efforts in promoting equity for women on campus. She was a member of the board of directors of A Safe Place, in Portsmouth, and a cofounder of The Collage, a learning center for women. She's also a charter member of Sexual Support Services in Portsmouth.

Now, after ten years at UNH, Hanson is beginning her second full year at the Thompson School. "Since the school is relatively small and self-contained, there's a chance to work more creatively as a teacher and to really get to know each student. Here, what happens in the class can be extended. The walls of the classroom can be moved."

by Louis Mazzari, writer/editor,
University Publications



In Assistant Professor Kate Hanson's classes in human relations and social issues, her emphasis is on process, on the means by which learning is accomplished. "How the class is structured, how students are encouraged to act, and the way material is presented all have a powerful impact on what students really learn."

Unlocking the mystery of movement

Can I share with you one of the foundational principles that govern my teaching here at UNH?" Ron Croce asks, and without hesitation continues. "The basic realization that whatever knowledge I have received I must pass on to others; that is, the knowledge I have acquired through the past dozen years must not remain imprisoned within me. It is my obligation—no, my charge—as a scientist and educator, to pass this information on to younger torch bearers."

Croce seems a born teacher, bubbling over with enthusiasm about his field of kinesiology and motor control, his students, and his research. Yet, when he graduated from college, he had no plans of taking up the teaching profession.

He wanted to be another Mickey Mantle.

His dream took him to Florence, Italy, where he played shortstop and outfield for a team in the Italian Professional Baseball League, and played in numerous international baseball tournaments across Europe and Japan. "I think every boy dreams of being a ballplayer," he laughs. "It was fun while it lasted."

A pre-med and physical education undergraduate student, he turned from baseball to medicine, his alternate occupational choice. He decided to stay in Italy and attend medical school, but dropped out after a year. "Sickness and death were not things I felt capable of handling on a day-to-day basis," he says. "But I was still very much interested in medicine, and particularly in motor disorders and the study of movement."

After a short stint teaching middle school biology in Italy, Croce returned to the United States, where he went on to earn his Ph.D. from the University of New Mexico. During his studies, he became increasingly interested in neuropsychology, a field of science which correlates psychological and neuro-

logical factors, and motor control, a discipline which investigates neuromuscular mechanisms of movement.

"I wanted to understand why certain populations have particular motor problems," he says. "And whether there's anything that can be done to remedy this."

One of Croce's recent research projects involved looking at the effects of exercise on fitness and work productivity in adults with mental retardation.

"What we found is that adults with mental retardation respond to a progressive exercise program in much the same manner as their nonretarded peers, and that such an exercise program can facilitate job performance," Croce summarizes.

He will begin research with UNH's Institute on Disability, working with autistic individuals. "For years, physicians and scientists thought these people were locked inside their own worlds, oblivious to their surroundings. Now we're discovering, with facilitated communication, that these people understand and communicate."

Facilitated communication is a method by which people with speech and neurological difficulties use letter boards or computers to spell out what they want to say. A facilitator often guides or steadies the hand or finger of the individual.

"Speech is one of the most intricate motor skills," Croce says. "The brain has to perform some extraordinarily complex

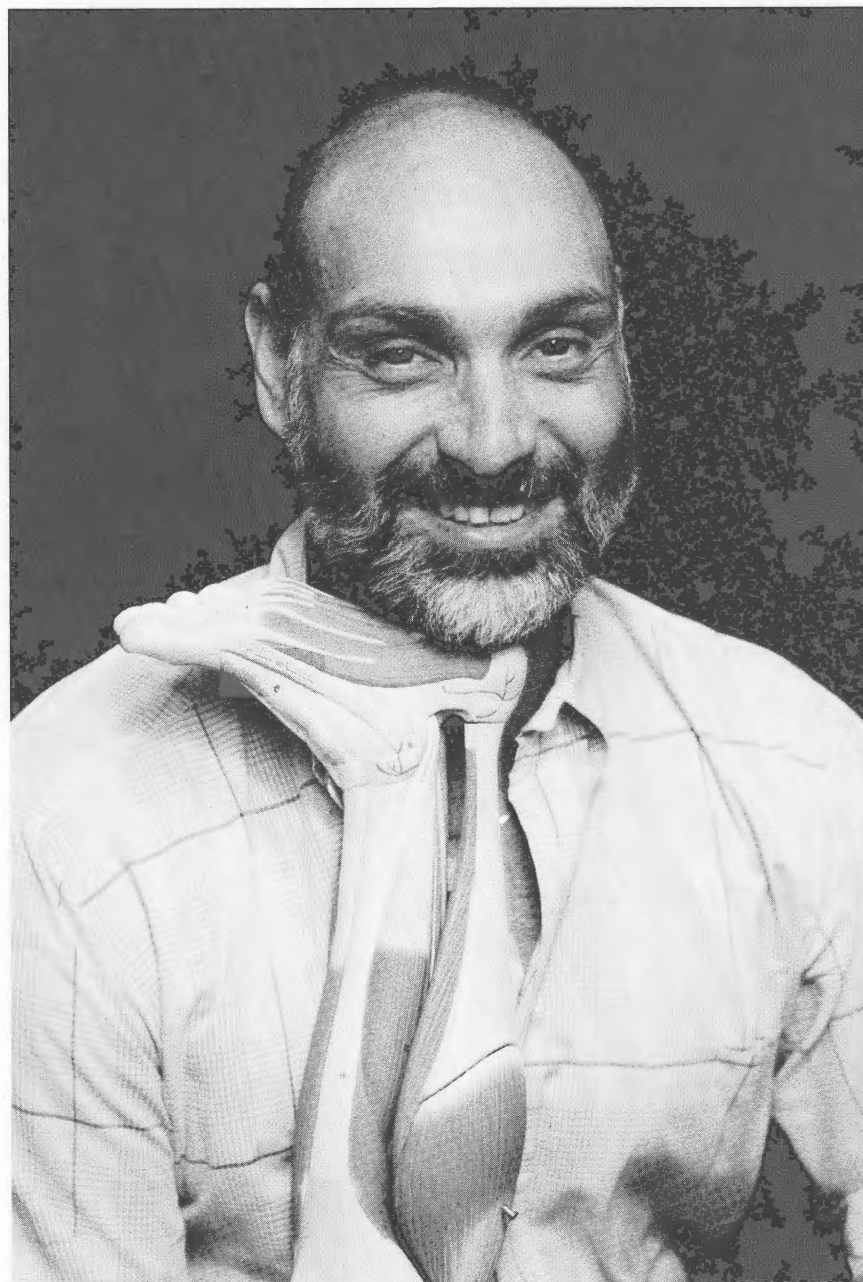
movement sequences in a relatively short period of time: muscles moving the lips and tongue must be activated in the correct sequence, at the correct time, and with the correct force of contraction. With facilitated communication, you are breaking down communication to a more simple task, that of a single joint-arm movement.

"It appears that what we have with autism is more than just a sensory disorder," Croce continues. "What we may also have is a type of apraxia, or a disorder in the execution of movement."

Croce, again, states the importance of research to good teaching, but stresses there must be a balance of the two.

"What drew me to UNH was that it affords the opportunity to teach as well as develop new knowledge," he says. "We can be doing the best research in the world, but if we can't pass it on, what good is it?"

by Sharon Keeler, writer/editor,
University News Bureau



This fall Ron Croce, associate professor of physical education, begins working with autistic individuals at UNH's Institute on Disability. "For years, physicians and scientists thought these people were locked inside their own worlds, oblivious to their surroundings. Now we're discovering, with facilitated communication, that these people understand and communicate."

A generosity of spirit, a gift for having fun

Becoming a modernist for Margot Clark was not a matter of choice. It happened.

"As a child I was always intensely interested in art. I remember pestering my father to take me to the art museum in St. Louis," Clark recalls. "It was a show of early modern painting. There were some post-Impressionists like Cezanne and it went on up to Picasso and Matisse, and there may have even been a few surrealist things. I was totally enthralled. My father simply wanted to leave, but he couldn't get me to go home. I tried to explain it to him but that was worse. I'm not sure how somebody that young decides that Cezanne or Matisse is the most wonderful thing that they've ever seen in their lives."

Initially, Clark decided to become an artist and studied art at Pennsylvania Academy, a professional school where students learned techniques for casting, stone carving, etc. She became a sculptor and taught at a private school until unexpectedly a disability necessitated a career change.

"Luckily, I was an egghead. . . . I was back in St. Louis and started taking courses in math, and just couldn't stop taking the stuff. I must have had wonderful teachers because we learned theory." But, after graduating with a B.S. in abstract math, she found the career possibilities unappealing and went on to graduate school in art history, a field she'd been interested in her entire life.

"It [art history] was something that I did anyway. I'd always looked at works of art as solutions to certain kinds of problems, both formal and symbolic," says Clark.

In class, Clark's approach seems improvisational. She begins her class simply by talking in a conversational tone as students settle into their seats. Soon the slide projector clicks

on and as Clark lectures, the projectionist changes slides without missing a beat.

According to Clark, the ability to conceptualize, i.e., to place works of art in historical context, is the essential skill a student must learn. Mere recognition of the current canon of "great art" will not suffice. Yet translating the instant experience of seeing into language that combines description, theory, and one's personal thoughts makes for a difficult writing task.

"I think it works," says Clark. "I have students who started out in classes as freshmen and sophomores where I was first introducing this, and I've been able to watch what happened. I think there were significant improvements in students' writing."

However, Clark's fame as a teacher is not based upon her innovative writing assignments. It has to do with a generosity of spirit, and a gift for having fun. She understands the "scruffy ways one has to make a living

veying an idea. And that the viewer is participating in the construction of that idea . . . Duchamp came up with that, Marcel Duchamp, who's one of the most interesting of the twentieth-century, I would say early, conceptual artists . . ."

And we're off and running. As Clark herself might say, "Hot dog!"

by Carrie Sherman, writer/editor,
University Publications



Working with Elizabeth Chiseri-Strater, a UNH colleague whose research concerns writing across the curriculum, and with Mara Witzling, a fellow art historian, Clark developed a new approach to teaching introductory courses in just the past five years. It involves a series of short writing exercises and revisions designed to develop critical writing skills. Some of the exercises are "published" or read in class. Fill-in-the-blank exams, given three times a semester, have a narrative structure that builds into an argument. These practical techniques develop the skills that lead to insightful, well-constructed term papers.

as an artist." She's willing and happy to stay up until 1:30 at night crafting a tapestry with which to frame a student's work. She has presided over happenings in the Dadaist mode such as the Inedible Food Art Auction or the Ugly Art Contest where students strove to make art with no redeeming social value. This spring students threw her a party (she retired from teaching this past semester) and from three great buckets of gumdrops, they made sculptures. When participants recall these events their faces light up, they laugh.

"It isn't so much that we make a mess," says Clark. "It's that the mess is capable of con-

"I learned how to see art as a piece of work, how to analyze, how to write a paper properly." Yukari Fujita, a '92 fine arts graduate from Yokohama, Japan, took three classes with Margot Clark, professor emeritus of the arts. "So, if I go to a museum, I know how to approach different types of art. She also helped to frame my painting—she stayed up with me until 1:30 for two nights to make the frame."

"Teaching is collaborating"

Philip Hatcher would have you believe the landscape of his day-to-day world is as undramatic as Crown Point, Indiana, where he grew up. Crown Point is across the state and south of the Michigan farm his great grandparents sold to put their three sons through college and start what Hatcher calls the "culture of teachers" from which he hails. But for someone whose idea of a great bumper sticker is "Boring is Beautiful," there seems to be a lot in Hatcher's life that is not.

During an hour-long interview he is interrupted three times. First, the department chair needs to discuss a detail concerning Hatcher's sabbatical this year at Digital Equipment Corporation in Maynard, Massachusetts. He will help create software to harness the power of parallel computers—untamed thinking machines able to rip through complex problems by dividing the duties among several smaller processors. He's been doing similar National Science Foundation-funded

research with an Oregon colleague for nearly six years.

Then, an overnight letter carrier delivers membership rules for a consortium in Japan allowing him to log on to one of those new machines—a brand new Fujitsu AP1000 designed with only rudimentary software. Hatcher was invited to join after the AP1000 ran well on some general software he co-wrote.

The third interruption was by UNH space scientist Terry Onsager, who telephoned to discuss a research proposal that would involve Hatcher in a study of the earth's magnetosphere with "lots of numbers to crunch."

Six years ago, Hatcher thought he would prefer staying in the Midwest. It was familiar. He'd had five interviews and five job offers from large Midwestern schools. At one he was told flat out that he would be frowned upon if his teaching reviews were too good "because it means you aren't doing enough research."

"I'm at UNH because of the impression I got that teaching is very important here," he says. Likewise in his family, Hatcher says. "Education was always important. Teaching was always the greatest thing you could do." But he learned that having teaching in your blood doesn't automatically make you a good teacher.

Hatcher taught full-time for five years at Chicago's Illinois Institute of Technology before coming to Durham. Like most professors, he had no formal training in teaching, nor, for that matter, any sort of apprenticeship. He simply took from his years as a student what had worked on him and abandoned what he despised. Not far into his teaching career, a grad student pulled him up short with a comment on the scope of Hatcher's lab assignments. Lighten up, the lab assistant suggested, "You have to re-

member, not everyone's going to be as good as you were when you were in college." This was a revelation. It brought Hatcher face to face with an important question every teacher has to face. How do you teach to the weaker students, the ones who may not find the subject as easy or compelling as you did?

"You've got to let them know you care about them doing well," Hatcher says. "Or you can end up as adversaries. Teaching is collaborating."

Hatcher muses, "I'm not sure I'm that strong in the classroom. I'm more comfortable one-on-one, in a mentoring role. I think my strength as a teacher and a researcher lies in the fact that I'm a great collaborator. People who collaborate should be valued."

Hatcher knew of UNH only through his wife, Peggy Kieschnick, a social worker interested in the work of the University's Family Research Laboratory. Otherwise, he might have skipped right over the ad for the position he now holds.

For his sabbatical this year Hatcher had also considered going to Hong Kong—where his wife grew up, the daughter of Lutheran missionaries—and to Chicago, home of Argonne National Laboratory.

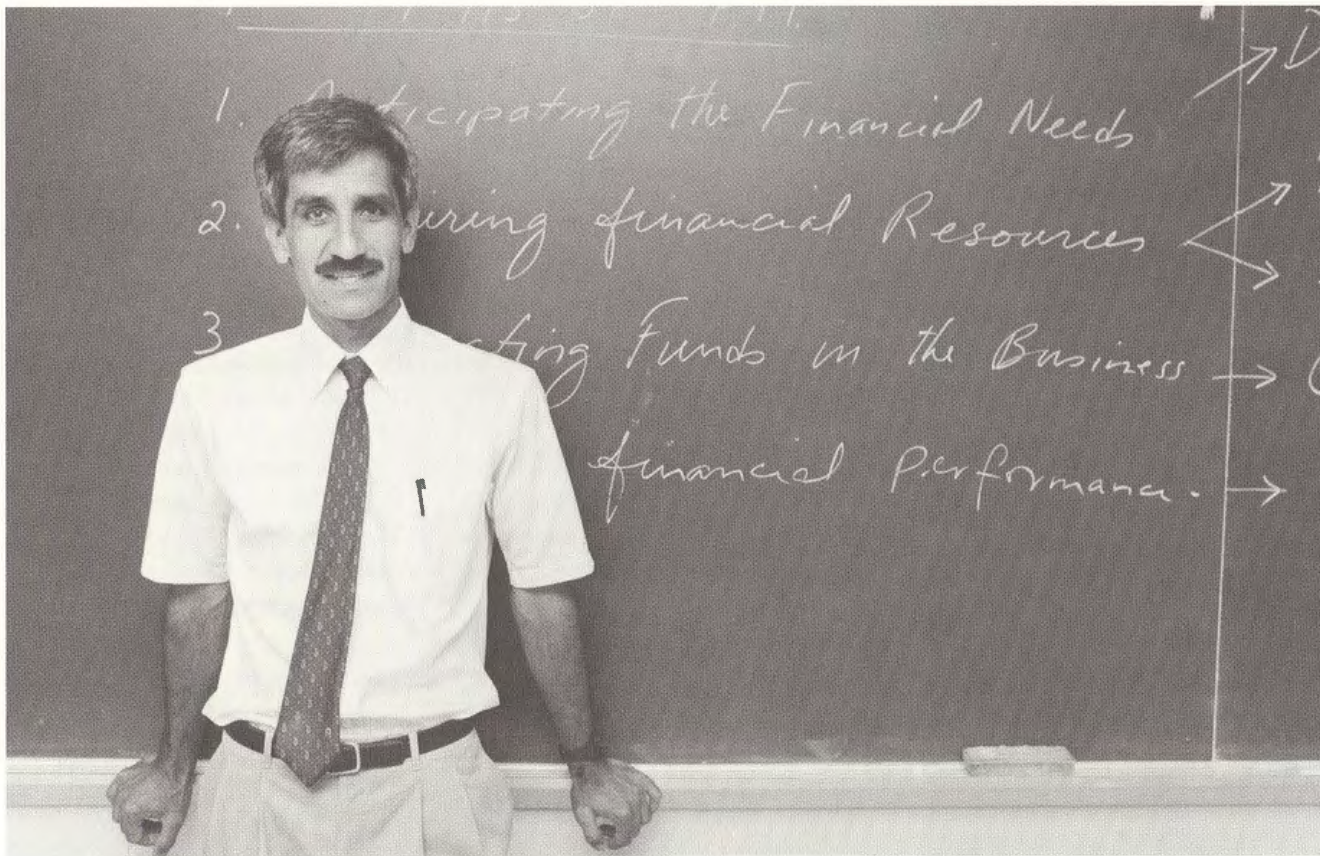
But Digital seemed like the best choice for family and professional reasons. "I'm kind of glad it worked out this way," Hatcher says, looking forward to collaborating in an environment where machines and software are developed together. Yet, with some trepidation he says, "I'm getting worried about that eighty-mile commute to Maynard."

It could get boring.

by Tad Ackman, writer/editor, College of Engineering and Physical Sciences

"I'm at UNH because of the impression I got that teaching is very important here," says Phil Hatcher, assistant professor of computer science. "Teaching is collaborating. I'm not sure I'm that strong in the classroom. I'm more comfortable one-on-one, in a mentoring role. I think my strength as a teacher and a researcher lies in the fact that I'm a great collaborator."





"When you grow up in a developing country like Iran, there is a great deal of pressure to do well in school," explains Ahmad Etebari, associate professor of business administration. "Education is regarded as the best insurance policy one can invest in. It is revolution-proof and is always with you right under your hat."

under certain circumstances, teaching feeds research," he says, explaining how the two are fully integrated. "My job is to transmit knowledge relating to the management of business organizations. What I regard as crucial is the creation of this knowledge, first, and then its dissemination and transmission to my students."

Over the years, Etebari has tried to incorporate his past and current research into his teaching. "Textbook theory is essential, but it can be dull without any applications to the real world," he says with a smile. "But once it is applied to real world phenomena, such as insider trading on Wall Street and joint ventures between U.S. firms and Eastern and Central European countries, students begin to develop an appreciation for theory."

Etebari regularly requires term papers in his classes, and works closely with students on their projects. He allows them to choose their own topics whenever possible, emphasizing that a researcher must have interest in his or her topic to turn out a good product.

These collaborative efforts have been so successful, in fact, that he has published three articles coauthored with students.

"Requiring research in my classes has brought about closer relationships with my students," he says with pride. "It's given them greater responsibility to think critically and ask questions—mostly the right ones!"

*by Sharon Keeler, writer/editor,
University News Bureau*

Breathing life into finance theory

Winning the 1992 Whittemore School of Business and Economics Teaching Excellence Award is fulfillment of a long-term objective Ahmad Etebari set for himself when he went up for tenure and promotion in 1986. Having grown up in an environment where education was a highly valued commodity, he recalls teachers being very respected. "To be sure, they were expected to know their stuff well, and be role models." Hence, when Etebari received his Ph.D. and became a professor of finance and accounting, he expected nothing less of himself.

"When you grow up in a developing country like Iran, there is a great deal of pressure to do well in school," he says. "Education is regarded as the best insurance policy one can invest in. It is revolution-proof and is always with you right under your hat."

He relates a story of his first teaching experience in the United States—one, he says, that greatly influenced his teaching career. It was in 1976

when George Christy, his advising professor at North Texas State University, asked him to cover his finance class.

"Scared that the students might not follow me because of my accent, I felt that I had no choice other than making sure I was fully prepared and that I knew how I was going to deliver my first formal lecture in front of a group," he says. "Well, I went ahead and survived it. The experience further convinced me that successful teaching requires planning, preparation, and knowledge of the subject."

Since that time, he has taught in such faraway places as New Zealand, Australia, and Iran, while keeping his home base at UNH. He's conducted research and published numerous articles, attended many industry conferences, and filled various professional and administrative positions.

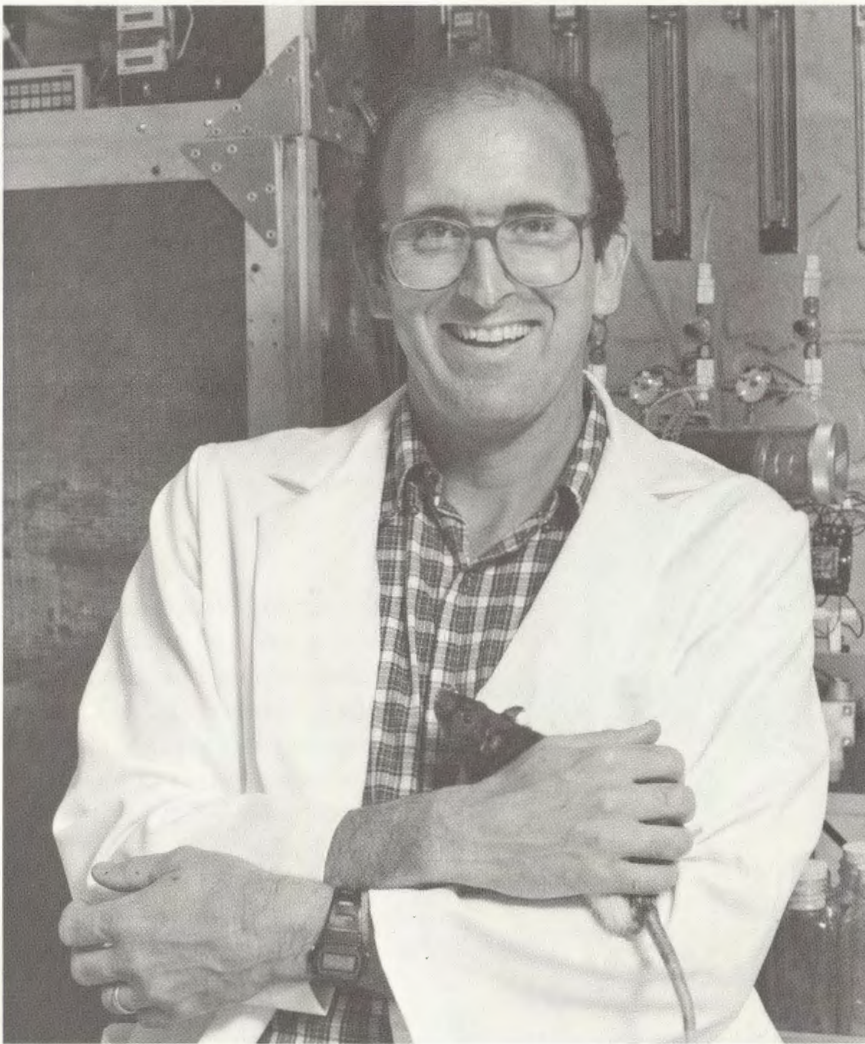
"My wife, Mahnaz, says, 'Go to your home,'" Etebari says with a laugh. "She's referring to my office, because she says that's where I spend most of my time."

At the Whittemore School, Etebari teaches finance and accounting in both graduate and undergraduate programs. While students may get confused over facts and formulas, he explains how strategies from the business world transfer quite nicely into the classroom.

"Teaching, for instance, consists of the same set of processes one would go through when he or she decides on creating and marketing a product. It involves research and development, processing and design, market testing, effective delivery, re-evaluation, and control.

"I would be scared to death to walk into a class when I am not fully prepared or when I have doubts about the relevance of the material I am supposed to teach. I have had my share of bad teaching days. They are more like product rejects, and they can ruin my week."

Etebari, whose research focuses on such areas as insider trading and international finance, believes that he could not be as effective a teacher if he were not doing research. "Research feeds teaching, and



"I have my students read the great experiments starting in the middle of the last century," says Robert Mair, associate professor of psychology. "I find that great experiments are like great poetry—they're easy to understand . . . A good experiment should set up the right questions, and the answers should have important implications for global questions."

Playing twenty questions with nature

Robert Mair says that researching amnesia is like playing twenty questions with nature.

The first major hurdle is defining what kind of behavioral deficit the disease causes. "Amnesia produces different deficits than the dementia you see in Alzheimer's," says Mair. "With the latter, it's as if you took a blowtorch to the brain—all the systems are gone. Reference memory—which relates to who someone is, what a fork is—is gone.

"Amnesia refers to the inability to remember separate events in time, what we call updated memory. 'Where are my keys today? When was that appointment I made?' These are mild examples of the kind of memory loss seen in amnesia. But these people are also liter-

ally unable to make any new memories. You can ask them what fork means and they'll know. That's a memory you don't have to update and this kind of deficit is very specific."

Mair began his journey through the neurophysiology maze shortly after he finished college. He graduated during the Vietnam War and, as a conscientious objector, spent his time in alternative service working at a psychiatric hospital in Providence, Rhode Island. Working with a neurologist, he studied patients with amnesia brought on by a disease called Korsakoff's syndrome. These patients were predominantly alcoholics, who because of poor nutrition, wound up with a thiamine deficiency that caused lesions in areas of the brain that are crucial to memory.

Mair began studying amnesia because of its relative mystery. "Potentially the memory loss in amnesia could involve several systems. I wanted to know which ones were critical and how this damage occurs."

With the animal models he's been studying at UNH, Mair has been able to discover why the brain lesions occur. He is able to quickly and temporarily induce thiamine deficiency in rats using a drug called pyritamine. He soon discovered that the brain lesions were in exactly the same locations as those found in humans with Korsakoff's syndrome. Next he studied the rats' ability to remember events that take place over time. To successfully perform the memory task, the rats had to remember what happened to them in previous trials and remember which side to go to next. The rats with the thiamine-deficiency induced lesions were unable to complete the task.

After discovering how lesions were induced, Mair and his colleagues decided to look for ways to prevent the amnesia from occurring. They tried a drug called MK-801 which blocked the formation of brain lesions and the accompanying memory impairment. Rats who were treated with MK-801 had no lesions and were able to complete the memory task successfully.

"Lots of treatments are being developed for memory loss—tissue implants, drugs, and drug implants. But you

can't go blindly trying them out on people. Therefore, when you can isolate the physiology of memory loss in rats, you can work on a treatment that has implications for humans. The fact that the lesions are located in the same places is a beginning, and the fact that MK-801 blocks the lesions and enhances memory is another step. But it still has too many side effects for use in humans."

On the other side of the lab table, Mair believes that teaching must be coupled closely with research. He teaches a course in research methods which helps get students involved in the hands-on process.

"What do I do when I teach?" he muses. "I have my students read the great experiments starting in the middle of the last century. I find that great experiments are like great poetry—they're easy to understand. I strive for the same thing when I teach students about research. I'll say, 'Get a small, doable project that has a clear outcome.' A good experiment should set up the right questions, and the answers should have important implications for global questions. To teach what goes into good research, you have to help students understand what makes good logic, fasten onto a problem, and see the world in that problem."

*by Susan Warner Smith, writer/editor,
University Publications*

A middle ground must be reached

Pete Pekins walks through a two-and-a-half-acre deer enclosure. A line of bucks and does follows him. He says, "I want to introduce you to the one who helped me the most in getting my degree at UNH." He begins calling, "Pip! Pip!"

From a shady corner of the yard, a fourteen-year-old doe named Pippin—Pip, for short—gets up from a nap and ambles over to Pekins and nuzzles his outstretched palm.

Pip has lived like a queen at the UNH Brentwood Wildlife Research Facility since her research days with Pekins, when the two of them, and two or three technicians, would go on camping trips to study what would become Pekins's master's thesis, "Summer and Fall Food Habits of Deer."

"We'd go to different parts of southern and central New Hampshire and pitch a tent, set up camp. Then we'd follow Pip around in the woods and record what she ate and what was available for her to eat."

Pekins, an assistant professor of wildlife at UNH since 1987, visits Pip every time he is at the Brentwood facility to work with his graduate students. His research is the ecological energetics of wildlife, investigating the energetics and nutrition of animals like the white-tailed deer, flying squirrels, coyotes, wild turkeys, bobcats, and spruce grouse, the latter an endangered species in much of the Northeast that lives at the higher elevations of the White Mountains.

Pekins's classes range from a dozen seniors in "Wildlife Policy and Management" to a general-education class with 265 students. His senior class must do research projects, which is not surprising. What is surprising is that he requires each student in his large gen-ed class to do a research project as well.

Pekins and his teaching assistant, Matt Sherfy, meet one-on-one with each of the 265 students to discuss research

proposals. Projects have ranged from studying the incidence of the Lyme Disease-carrying deer ticks on harvested deer, to examining the migration pattern of dolphin pods, or groups, in the ocean.

In his smaller senior class on wildlife management and policy, Pekins takes a dozen to eighteen students to spend time with a sixty-year-old farmer he knows in the New York town where he grew up—a town, he says, "that has more cows than people and more deer than cows." It is also an area where, unlike New Hampshire, every square inch of land is posted against hunting by outsiders.

The farmer—who does not allow the hunting of female deer on his property—through Pekins, becomes a teacher. "My students go there knowing what they know from lectures and textbooks. They want to be wildlife managers, which means, in some cases, that full protection of a species—and in the case of deer, females—is not always the best. Yet, here is a man who speaks with great passion about his protected does, a

passion that is the opposite philosophy of good management. But how can anyone leave there not understanding the farmer who will not allow doe hunting on his property?"

The purpose of the trip, according to Pekins, is to teach students that the use of the land is a privilege, not a right; that, like the hunting debates in the classroom, a middle ground must be reached between wildlife managers, policy professionals, and land owners.

"Land owners," explains Pekins, "control access to wildlife. Our relationship to them is the key to that access. The most important part of the lab is students' learning how to talk with property owners, to have respect and understanding for their views, because that's who they're ultimately going to have to work with."

Pekins opens the gate of a fenced-in pen. From under a tree, two fawns scamper over to him on spindly legs, and make mewing noises as he talks to them.

Pekins is asked if students become too attached to the deer,

and how he deals with that as a teacher and wildlife manager if they do. He closes the gate and looks down at the ground for a moment. "Oh," he says, quietly. "I am the worst offender, I think. I've spilled some tears over a couple of deer."

by Kim Billings, director, University News Bureau

Assistant Professor of Natural Resources Pete Pekins's classes confront the issues of hunting and the use of animals in research. "The debate is healthy," he says. "My philosophy is, people argue because they care about the subject. Wildlife is an inflammatory subject, but I tell my students that we need to come to some kind of middle ground."



Curiosity is the starting point of learning

I began my career at UNH in the fall of 1954 with an enthusiasm for teaching that has lasted up to the present day. It has always seemed to me that helping people to achieve an understanding of new concepts, to broaden their horizons, and to develop their talents, is a worthy endeavor too often underrated.

I have always been curious about the things that I experienced, and wanted to understand them better. I started studying physics with a stream of questions. Why is ice slippery? Why does wet sand have a dark color while dry sand is light? Why doesn't a gyroscope fall over? If light waves and radio waves are exactly the same except for their frequency, how is it possible to hear the local radio station on a portable radio inside a darkroom?

After trying to respond to my own questions, and then asking other people, I quickly realized that it was a lot easier to ask the questions than it was to answer them. However, I still remember my feeling of achievement when I was able to resolve a question, and the pleasure that I felt when someone else was able to explain something to me in a way I could understand. I started out teaching with the strong desire to help my students experience these same feelings.

The horizons in physics are truly incredible! Current investigations in quantum theory and relativity are pushing the most fundamental limits of space and time, while investigations into the solid and superconducting states are revolutionizing the designs of materials, communication devices, and computers. I want my students to be aware of the range of options that are opening up to them, but to realize that new additions to these fields are only likely to be made by "well-equipped" individuals. Students must make a large and sustained effort to develop the advanced conceptual

and mathematical tools they will need in order to work with the subtle patterns that are emerging in these areas. I want to help them to develop these tools, as well as the persistence and clarity of thought that are essential if they are to turn their hopes for professional achievement into realities. And, I would like to do this without having their interest and enthusiasm, which is sparked by exciting ideas, smothered under a blanket of unimaginative detail.

Teaching and learning fuse intellectual and emotional experiences. They appear in different proportions at different stages of one's understanding. Ideally, curiosity is the starting point. Successive stages of increasing understanding then provide fulfillment.

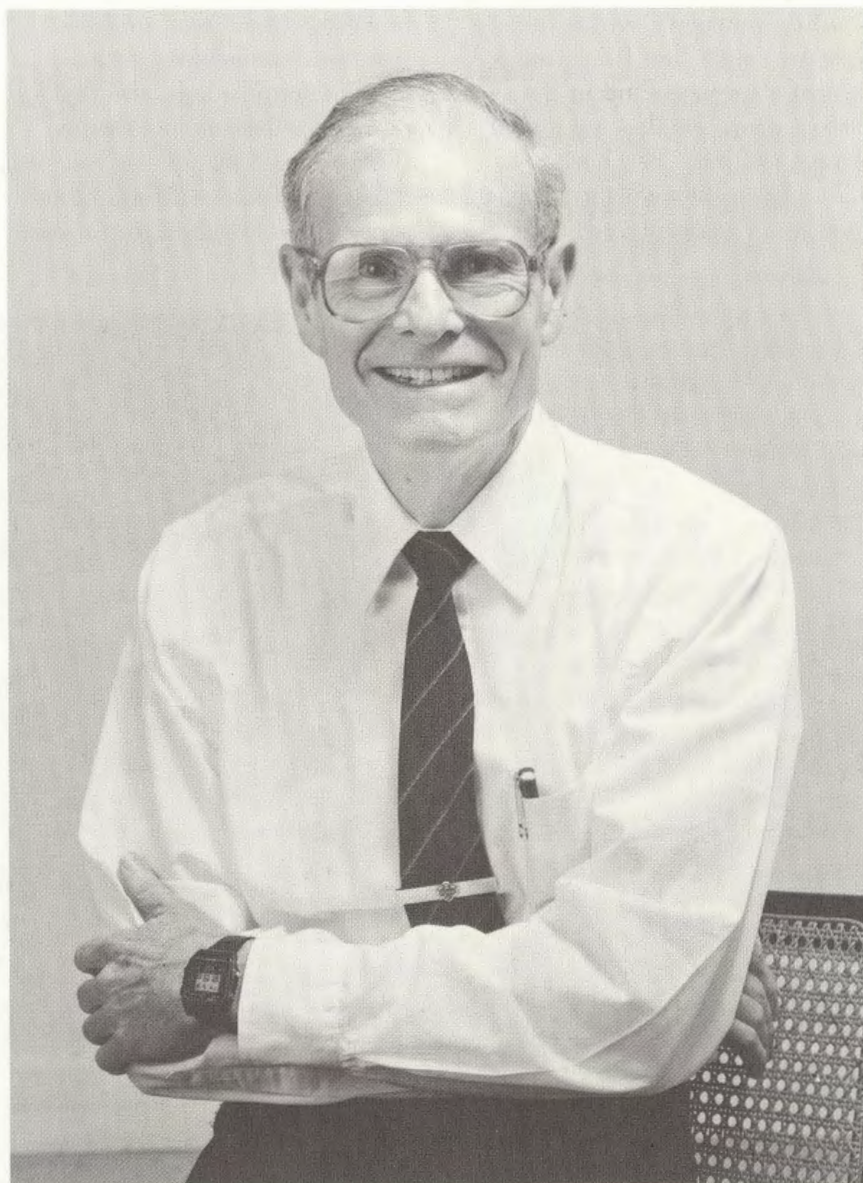
I try to capitalize on this feeling of curiosity to help students assimilate the unexciting details that are required to reach an understanding. I make every effort to place these details into a comprehensive pattern, and to have students feel that they have my full support as they try to crystallize this pattern in their minds. This crystallization usually occurs in steps. The time between the initial exposure and first stage of crystallization is short for some concepts and long for others. It is common for students to find that concepts which weren't really clear one year can be used with ease the next. But, whenever it occurs, I always feel a flash of excitement when students' eyes light up as they suddenly understand a point that has been

troubling them. This "Eureka effect" is a great stimulus to further inquiry.

I also hope to help my students develop their sense of professional quality. I think that this can only be done by introducing them to first-rate work and telling them why I think it's good. Therefore, I have continually struggled to expand my own understanding, to refine it, and put it into a form that will be more readily accessible to my students.

Over the years, I have found the greatest satisfaction in my interaction with students. I treasure the friendships I have made with them, and appreciate the way they have enlarged both my personal and professional horizons. Doing my best to teach them has been my primary professional goal throughout my entire academic career. Consequently, it gives me enormous pleasure to have received their vote of confidence in the form of the CEPS Teaching Excellence Award for 1992.

by John Mulhern, professor of physics



"I have always been curious about the things that I experienced," says John Mulhern, professor of physics, "and wanted to understand them better. I started studying physics with a stream of questions. Why is ice slippery? Why does wet sand have a dark color while dry sand is light? Why doesn't a gyroscope fall over?"

Thomas Ballestero

Excellence in Public Service Award



For Tom Ballestero, associate professor of civil engineering, public service extends across the broadest possible landscape—from lectures at elementary schools to appearances on national television to testimony before the U.S. Congress. He spent last year, for example, developing water resources in Brazil. His kids call him “the world famous hydrologist.”

Getting immediate answers to problems

Thomas Ballestero considers by example what constitutes public service. “Working as a hydrology consultant in Colorado, I started playing on a basketball team with irrigators and farmers,” he says. “But whenever they needed a hand, I ended up milking cows. It was always hard to differentiate between what you’d call public service and doing something for a friend.”

Sitting in an office lined with books and reports, a disheveled juggling act of critical projects, he motions to a phone hidden behind a stack of papers. “A friend of mine just called,” he offers. “He had a small dam built and has a problem with it, so I’m going out to look at it today. That’s what I think of as public service: Who’s pump is broken? Who’s dam isn’t working?”

For Ballestero, public service extends across the broadest possible landscape—from lectures at elementary schools to appearances on national television to testimony before the

U.S. Congress. Ballestero rewrote the state’s solid waste regulations and created a system to help site its landfills. He directs the New Hampshire Water Resources Research Center. He’s contributed to the cleanup of Boston Harbor. He spent last year in the arid northeast of Brazil, as a Fulbright Scholar, developing the region’s water resources. His kids call him “the world famous hydrologist.”

He calls himself “a can-do person. Civil engineering is applied science. It’s getting immediate answers to problems.”

Ballestero grew up in King of Prussia, Pennsylvania, north of Philadelphia. “I was raised in a wholesome family environment, and whatever community service was needed, my parents plugged into it. My mom was involved in a cultural center, and had me help out by mowing lawns, setting up for fund-raisers, etc. My father’s also a civil engineer, and he would drag my brother and me to projects just to get us out of my mother’s

hair. My folks devoted a lot of their lives to raising their kids, and it was never an environment of constraints or negativism.

“And going to college at the start of the 1970s also supported that can-do thinking, the belief that people do make a difference. I wasn’t the best student, but I was always volunteering to do a lot of things.”

Volunteering to do a lot of things now makes the phone ring constantly. “It has a lot to do with what my expertise is,” says Ballestero. “Water. Everybody’s an expert on water because everybody uses it. But when their expertise runs short, they call me. And a lot of times, I’ll bring students along. It gives them a respect for other opinions, as nontechnical as they may be. And it allows them to form their own opinions. It’s really the perfect non-classroom experience.”

Projects are brought back to the classroom. Several years ago, a town in Wyoming called in Ballestero to develop a new water supply. “I found they had

plenty of water, but the pipes they’d installed were too small for the volume. Since then, I’ve used that as a senior project, and invariably, students come to the same conclusion. It gets them prepared for taking off the blinders and looking at the context of a problem before coming to a conclusion.”

He also prepares them by advocating volunteerism. “I tell undergraduates, ‘The first three to six months on your first job won’t be much fun. Accept and undertake any and all responsibility you can. It pays off in the contacts and the reputation you develop.’”

He wants to convince them of the success volunteerism will engender. “What this public service award means to me,” he says, “is that, as faculty members, we’re used as role models, and hopefully we’re instilling in students a belief in applying themselves to what they know.”

*by Louis Mazzari, writer/editor,
University Publications*

New models of teaching and learning

Date: 04 Jun 1992
14:42:20-0600 (MDT)
From: SMTP%"root
@GoldnG8.UnivNorthCo.EDU"
To: T_Ackman@UNHH.UNH.
EDU

If you've read Michener's *Centennial*, you know exactly the sort of environment I'm in out here. It's not the "wild" West anymore, but when the

wind is right, which is most of the time, you can smell the feedlots. The Monfort meat processing plant is north of town. It's not that bad. In fact, Greeley has a lot going for it—60,000 people, I don't know how many cattle, and the services are a nice change. There are about fifteen nice, small parks, eight elementary schools, and a civic

center with a theater as large as some in Denver.

Why am I here? The short answer is that I'm undergoing a mid-life change from environmental chemistry researcher to chemical education researcher. I became so dissatisfied with my own teaching, and the state of science education in general, that I decided "someone ought to do something about it." So here I am, taking the plunge into a new culture that is very different from that of the physical sciences.

The University of Northern Colorado just began a new Ph.D. program in chemical education, making it unique in the country. In most places, people get Ph.D.s in science education through schools of education. Here, it's in the chemistry department. I teach a couple of regular college chemistry courses, which helps on the financial end. But mainly, I've been reading and learning as much as I can about issues and research in science education.

My colleagues will probably think I've gone soft in the head. Actually, the people in my department have been much more open-minded and concerned about teaching than in a lot of chemistry departments I know of. They may live to regret it; I have missionary intent.

When I get back, I plan to transform the way science is taught and learned at UNH and throughout New Hampshire. Sounds crazy, doesn't it? I'm not sure it isn't. It won't happen all at once, and I won't be working alone. I have some like-minded colleagues with whom I've collaborated. We came *this* close to getting a supermega-buck National Science Foundation grant to begin the metamorphosis. There will be other grants. And there are others on campus who are concerned about transforming our models of teaching and learning. Why shouldn't UNH be a national leader in university pedagogy?

One of the things I will work on when I get back is developing a chemistry course for elementary teachers driven totally by the laboratory. At every level of education, kindergarten through college, science in general is not taught as a way of knowing—it's taught as a collection of facts, an established body of knowledge. The real power of science is not simply what has been accomplished but *how* it has been accomplished.

A primary goal of science education should be helping students to understand and to practice these ways of knowing in the context of their science courses. The course I'm planning will model the sort of approaches teachers ought to be using with elementary kids. At the same time, I want to bring high school and university colleagues in as participants to see what it's all about. Maybe something will rub off and get them thinking about their own courses.

Anyway, that's how things look from here. I hope everything's going well in Durham and look forward to catching up with you when I get back.

Chris

by Christopher Bauer, associate professor of chemistry.

Christopher Bauer, associate professor of chemistry, remembers failing his first test in high school chemistry. After nine years teaching environmental chemistry, Bauer spent last year on sabbatical at the University of Northern Colorado, studying the way science is taught at all levels of education. He wrote last spring from Greeley by electronic mail.

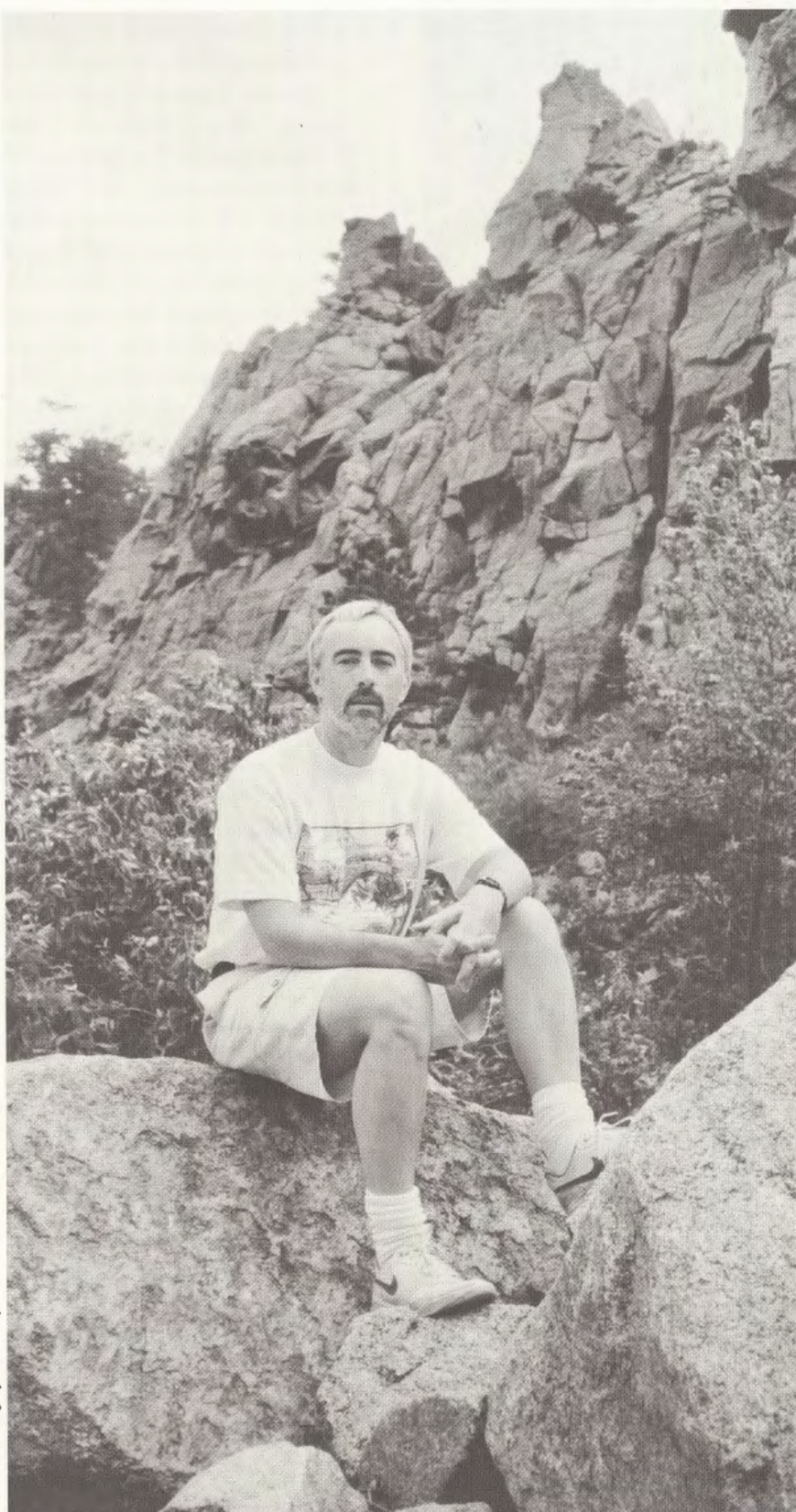


Photo courtesy of Christopher Bauer